# Mingjie Bi

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## EDUCATION

**Ph.D.**    **University of Michigan**                                              Ann Arbor, MI, USA | 2020.8-2023.8
- Robotics (GPA: 3.984/4.0): Smart Manufacturing, Industrial Robotics, Optimization, etc.
- **Thesis:** Distributed Decision-making in Disrupted Industrial Environments using a Multi-agent Framework

**M.S.E.**    **University of Michigan**                                            Ann Arbor, MI, USA | 2018.8-2020.4
- Mechanical Engineering (GPA: 3.978/4.0): Control Theory, System-Level Control, etc.

**B.S.**    **Huazhong University of Science and Technology (HUST)**        Wuhan, Hubei, China | 2014.9-2018.6
- Marine Engineering (GPA: 3.91/4.0): Autonomous Underwater Vehicle, Multi-ship Formation Control, etc.

## KNOWLEDGE & SKILLS

- **Expertise**: Distributed AI, Multi-agent Systems, Deep Learning, MARL, LLM, Agent-based Simulation, Operations Research, Optimization, Risk Management, Smart Manufacturing and Supply Chain, Industrial Robotics
- **Programming**: Python, Java, MATLAB/Simulink, C/C++, Ladder logic
- **Software/Tools**: PyTorch, RepastS, Gurobi, TensorFlow, SolidWorks, ROS, Adams, AutoCAD
- **Language**: Mandarin (Native), English (Proficient)

## WORK EXPERIENCE

**Beijing Institute for General Artificial Intelligence**, Research Scientist        Beijing, China | 2024.2-Now
- Developed an itinerary generation model driven by human intentions and value preferences, leveraging analysis of human behavioral data.
- Built a multi-agent simulation environment, *AdaSociety*, that explicitly represents agent social relationships, supporting research on social structure dynamics with RL and LLM. ↗
- Participated in drafting national-level project proposals with a total funding exceeding 100M CNY, and coordinated with partner organizations.
- Served as a co-advisor for two PhD students in collaboration with top universities, guiding research in AI and multi-agent systems.

**Hitachi America Ltd.**, Smart Manufacturing Researcher        Farmington Hills, MI, USA | 2023.7-2023.12
- Developed Manufacturing Execution System (MES) for battery manufacturing line using Ignition
- Designed a human behavior recognition algorithm using LSTM and CNN with IMU and pressure data from wearable gloves for operation completeness verification.

## SELECTED PUBLICATIONS

- J.-A. Estrada-Garcia, **M. Bi**, D. M. Tilbury, K. Barton, and S. Shen, A Lead-Time-Aware Decomposition Approach to Optimize Disruption Response in Supply Chains. *IEEE T-ASE*, 2025. ↗
- B. Fu, **M. Bi**, S. Umeda, T. Nakano, Y. Nonaka, Q. Zhou, T. Matsui, D. M. Tilbury, K. Barton, Digital Twin-based Smart Manufacturing: Dynamic Line Reconfiguration for Disturbance Handling. *IEEE T-ASE*, 2025. ↗
- Y. Huang, X. Wang, H. Liu, F. Kong, A. Qin, M. Tang, S.C. Zhu, **M. Bi**, S. Qi, X. Feng, AdaSociety: An Adaptive Environment with Social Structures for Multi-Agent Decision-Making. *38th NeurIPS*, 2024. ↗
- **M. Bi**, J.-A. Estrada-Garcia, D. M. Tilbury, S. Shen, and K. Barton, Heterogeneous Risk Management Using a Multi-agent Framework for Supply Chain Disruption Response. *IEEE RA-L*, 2024. ↗
- **M. Bi**, D. M. Tilbury, S. Shen, K. Barton. A Distributed Approach for Agile Supply Chain Decision-Making Based on Network Attributes. *IEEE T-ASE*, 2023. ↗
- J.-A. Estrada-Garcia, **M. Bi**, D. M. Tilbury, S. Shen, and K. Barton, A multi-objective mixed-integer programming approach for supply chain disruption response with lead-time awareness. *IEEE 19th CASE*, 2023. ↗
- **M. Bi**, I. Kovalenko, D. M. Tilbury, K. Barton. Dynamic distributed decision-making for resilient resource reallocation in disrupted manufacturing systems. *IJPR*, 2023. ↗
- I. Kovalenko, J. Moyne, **M. Bi** et al., Towards an Automated Learning Control Architecture for Cyber-Physical Manufacturing Systems. *IEEE Access*, 2022. ↗

- ***M. Bi***, G. Chen, D. M. Tilbury, S. Shen, K. Barton. A Model-based Multi-agent Framework to Enable an Agile Response to Supply Chain Disruptions. *IEEE 18th CASE*, 2022. ↗
- ***M. Bi***, I. Kovalenko, D. M. Tilbury, K. Barton. Dynamic Resource Allocation Using Multi-Agent Control for Manufacturing Systems. *MECC*, 2021. ↗

## RESEARCH EXPERIENCE

**A Model-based Multi-agent Framework for Agile Response to Supply Chain Disruptions**  2021.9-2024.9
Independent Research, Advisors: Profs. Kira Barton and Dawn M. Tilbury  Ann Arbor, MI, USA
- Developed a model-based multi-agent framework and heuristic-guided communication algorithms to conduct MILP optimization for re-planning of unexpected disruption response in supply chain networks.
- Implemented the framework using Python and achieved an 85% reduction of computational efforts with only a 4% loss of optimality compared with centralized methods.
- Designed heterogeneous risk management using stochastic programming in uncertain supply chain environments.

**Dynamic and Resilient Resource Reallocation in Multi-Agent Manufacturing Systems**  2019.2-2022.3
Independent Research, Advisors: Profs. Kira Barton and Dawn M. Tilbury  Ann Arbor, MI, USA
- Modified PLC and JADE implementation to achieve multi-agent control for a manufacturing testbed
- Designed a capabilities-based clustering scheme and risk assessment mechanism for resource agent coordination rescheduling after resource breakdown in dynamic stochastic manufacturing environments
- Programmed the methods in RepastS using Java and demonstrated an 11% improvement in throughput recovery and a 50% reduction of occurred disruptions.

**Hydrodynamics Analysis and Computation of Underwater Dual Manipulators**  2018.1-2018.7
Independent Research, Advisors: Prof. Xianbo Xiang  Wuhan, Hubei, China
- Built the 3D model of an underwater vehicle/manipulator system (UVMS) using SolidWorks and conducted its dynamic simulation using Adams
- Proposed a method of calculating driving torque combining hydrodynamic model and simulation results

## OTHER PROJECTS & COURSE WORK

**Visual-Inertial SLAM with Right Invariant EKF**, Course  Ann Arbor, MI, USA | 2021.1-2021.4
- Modified an existing visual-inertial SLAM algorithm with a Right-Invariant Extended Kalman Filter
- Succeeded in vehicle state estimation through the implementation using Python in ROS

**Comprehensive Acting, Sensing, and Reasoning for Autonomous Robots**, Course  Ann Arbor, MI, USA | 2020.1-2020.4
- Implemented PID controller and reference tracking algorithms on a Balancebot, using C
- Conducted manipulator modeling and motion planning for object detection and grasping, using Python
- Achieved robot action and sensor modeling, SLAM, and path planning with map exploration, using C++

**Trajectory Planning for Autonomous Vehicles: An MPC Application**, Course  Ann Arbor, MI, USA | 2019.8-2019.12
- Proposed a constraint switching mechanism based on vehicle position for the MPC reference tracking problem
- Realized reference tracking in a simulation by solving MPC problem considering vehicle model

**Motion Planning and Control for Autonomous Robots**, Course  Ann Arbor, MI, USA | 2018.8-2018.12
- Conducted forward and inverse kinematics modeling of a robot manipulator (Fetch)
- Applied A* and RRT for robot motion planning with collision avoidance, using JavaScript

## SELECTED HONORS & AWARDS

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| **Best Conference & Application Award Finalist**, IEEE CASE | 2022 & 2023 |
| **Rackham Conference Travel Grant**, University of Michigan | 2021 & 2022 |
| **Outstanding Graduates**, HUST | 2018 |
| **National Scholarship**, Ministry of Education of the People's Republic of China | 2016 & 2017 |
| **Merit Student**, HUST | 2016 & 2017 |
| **Best Application and Creativity Award**, National Marine Vehicle Design and Production Contest | 2017 |
| **First Prize in Hubei Province**, Challenge Cup | 2017 |
| **Second Prize in China**, Challenge Cup | 2017 |
| **Excellent Student for Academic Performance**, HUST | 2016 |
| **Naval Architecture and Ocean Stars Scholarship**, HUST | 2016 |

## LEADERSHIP & ACTIVITIES

**Paper Reviewer**, Academic community                                                      2021.5-Now
  - IEEE Access (10), IEEE T-ASE (2), IEEE RA-L (2), NeurIPS (2), CASE (6), MECC (2)

**Poster presentation**, Midwest Workshop on Control and Game Theory                  2023.4
  - Distributed decision-making in disrupted industrial environments using a multi-agent framework

**Member**, Robotics Graduate Student Council, Robotics Department, University of Michigan       2020.9-2023.8
  - Awarded Robotics Outreach Ambassador

**President**, Student Union, School of Naval Architecture & Ocean Engineering, HUST       2014.12-2016.12
  - Awarded Outstanding Student Union in HUST (1/77), which was the first time in 6 years